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EXAMINER

NATNAEL, PAULO S M

ART UNIT

PAPER NUMBER

2614

DATE MAILED: 09/12/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

09/577,478

Applicant(s)

HEATH, THOMAS S.

Examiner

Paulos M. Natnael

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 June 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-22 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims **1-22** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Szeliski et al.**, U.S. Pat. No. **6,157,747** in view of **Eppler**, U.S. Pat. No. **6,084,989**.

Considering claim 1, Szeliski discloses the following claimed subject matter, note;

- a) the claimed method of extracting a sequence of video frames is met by image frames Io-Ik inputted into the step 110, FIG. 1; (see also FIGS. 3 and 6).
- d) the claimed method of aligning the interpolated video frames is met by step 120, FIG.1;
- e) the claimed method of creating a single image from the aligned video frames is met by output image, FIG.1, which constructs an image mosaic;

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Except for;

- b) the claimed method of sampling each of the video frames;
- c) the claimed method of interpolating the up sampled video frames;

Regarding b), Szeliski et al. discloses 3-dimensional image rotation method and apparatus for producing image mosaics. Szeliski doesn't specifically disclose ^{the term} "up sampling". However, Szeliski et al. discloses ^{terms} "sampling" and "resampling" of the frames I_0 - I_k in, for example, step 860, FIG.8; and, resamples the output version of $I_k(x)$ in step 2080 (FIG.20).

Eppler discloses a system and method for automatically determining the position of landmarks in digitized images derived from a satellite based imaging system. Eppler discloses a landmark positioning system 20 comprising the Image Restoration (upsampler 7x4) 24 that up samples the image patch.

Therefore, it would have been obvious to the skilled in the art at the time the invention was made to provide the up sampler 24 of Eppler and modify the system of Szeliski in order to provide the latter with an upsampling capability.

Regarding c), Szeliski discloses a method of interpolation (step 2060, FIG.20) and modification of alignment parameters (step 1050, FIG. 13) and data interpolation (step 2640, Fig. 20). The system of Szeliski performs the claimed functions such as interpolation and sampling in reverse order, that is, alignment comes first, then sampling and interpolation, etc. However, it would have been obvious to the skilled in the art at the time the invention was made that the order

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of performing the functions such as interpolation and sampling would merely be an obvious engineering choice.

Considering claim 2, the claimed method wherein the sequence of video frames are low resolution images is met by Fig. 10 which illustrates a coarse-to-fine resolution hierarchy employed in one implementation, i.e., starting with low resolution.

Considering claim 3, the claimed method wherein said up sample step is by a factor of 4 .

Regarding claim 3, see rejection of claim 1 (b).

Considering claim 4, the claimed method wherein said align step comprises aligning the video images in an x direction and a y direction in a center portion of interest in each video frame is inherent, because alignment of images implies in all directions. (See also FIG.3)

Considering claim 5, the claimed comprising extracting the sequence of video frames at 30⁺ frames/sec is inherent, because the rate of 30 frames/sec is standard in video/television systems.

Considering claim 6, the claimed wherein the sequence of video frames includes 5 video frames is met by initial frames I₀-I_k; (FIG.1)

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Considering claim 7, the claimed method of correlating the up sampled video images is met by the "Patch-based algorithm" step 120, FIG.1. (See also rejection of claim 1 (b));

Considering claim 8, the claimed rising averaging a pixel intensity from each of the up sampled video frames is met by the disclosure that "The blending of the corresponding pixel value employs a weighted average according to" the formula given on col. 30, lines 1-3.

Considering claim 9, the claimed comprising compensating for platform movement and rotation zoom is met by the disclosure that "Based on this rotational panoramic representation, block adjustment (global alignment) and deghosting (local alignment) methods disclosed herein significantly improve the quality of image mosaics, thereby enabling the construction of mosaics from images taken by hand-held cameras." (Col. 32, lines 12-18)

Considering claim 10, the claimed aligning each the extracted sequence of video frames **before** said **up sample** step;

Regarding claim 10, see rejection of claim 1(c).

Considering claim 11, identifying commonality from one individual frame to the next and overlapping the individual frames and displaying an image representing a continuous area is met by FIG.3, which illustrates overlapping individual frames and displaying a panoramic image

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Considering claim **12**, extracting the sequence of video frames at 30 frames/sec is **inherent**, because the rate of 30 frames/sec is standard in television systems.

Considering claim **13**, the claimed wherein the sequence of video frames includes 5 video frames.

Regarding claim **13**, see rejection of claim **6**.

Considering claim **14**, the claimed correlating the up sampled video images is met by the "Patch-based algorithm" step 120, FIG.1. (See also rejection of claim **1 (b)**);

Considering claim **15**, the claimed averaging a pixel intensity from each of the up sampled video frames.

Regarding claim **15**, see rejection of claim **8**.

Considering claim **16**, The claimed comprising compensating for platform movement and rotation zoom.

Regarding claim **16**, see rejection of claim **9**.

Considering claim **17**, the claimed method of aligning each [of] the extracted sequence of video frames before said up sample step.

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Regarding claim 17, see rejection of claim 1 (c).

Considering claim 18, identifying commonality from one individual frame to the next and overlapping the individual frames and displaying an image representing a continuous area.

Regarding claim 18, see rejection of claim 11.

Considering claim 19, see rejection of claim 5.

Considering claim 20, see rejection of claim 1.

Considering claim 21,

a) the claimed at least one sequence of machine executable instructions is met by the Application Programs 36 in System Memory 22 of the PC 20, FIG. 2A.

b) the claimed a medium bearing the executable instructions in machine form, wherein execution of the instructions by one or more processor causes the one or more processor to extract a sequence of video frames, up sample each of the video frames; interpolate the up sampled video frames; align the interpolated video frames; and create a single image from the aligned video frames;

Regarding b), see rejection of claim 1. (See also Fig.2A)

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Considering claim 22, **Szeliski** discloses the following claimed subject matter, note;

- a) the claimed processor is met by Processing unit 21, FIG. 2A;
- b) the claimed memory coupled to said processor is met by system memory which includes ROM 24 and RAM 25, FIG. 2A;
- c) the claimed memory having stored therein sequences of instructions when executed by said processor, causes said processor to perform the steps is met by the Applications Programs, 36 FIG. 2A.
- d) the claimed steps of extract a sequence of video frames; up sample each of the video frames; interpolate the up sampled video frames; align the interpolated video frames; and create a single image from the aligned video frames;

Regarding d), see rejection of claim 1.

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Paulos Natnael** whose telephone number is (703) 305-0019. The examiner can normally be reached on **Monday through Friday** from **6:30 a.m.** to **3:00 p.m.**

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **John Miller**, can be reached on **(703) 305-4795**.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is **(703) 305-3900**.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

(703) 872-9314, (for formal communications intended for entry)


or:

(703) 872-9314 (for informal or draft communications, please label "PROPOSED" OR "DRAFT").

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, V.A. Sixth Floor
(Receptionist).

Paulos M. Natnael

September 4, 2002


JOHN MILLER
SUPERVISORY PATENT EXAMINER
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